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10 February 1965

COST OF CONSTRUCTION AND CAPITAL INVESTMENT
IN SELECTED PLANTS OF THE SOVIET AEROSPACE INDUSTRY,
KUYBYSHEV PLANTS NO. 1, NO. 18, AND NO. 24

CIA/RR EP SC 65-2

(ORR Project No. 33.4496)

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FOREWORD

This publication is not an industrial analysis of the Kuybyshev facilities or their activities but is intended to be used in conjunction with other reports as an aid in such analysis and as a source of supplemental data. The term aerospace industry refers to major plants for the fabrication and assembly of missiles, aircraft, and related engines. Common construction cost inputs and a common construction capital investment ratio have been used in all computations. The basic methodology used to cost the facilities was set forth in an earlier publication, CIA/RR EP SC 64-16, Cost of Construction and Capital Investment in the Dnepropetrovsk Missile Development and Production Center, October 1964, TS CHESSE RUFF/NO FOREIGN DISSEM.

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COST OF CONSTRUCTION AND CAPITAL INVESTMENT
IN SELECTED PLANTS OF THE SOVIET AEROSPACE INDUSTRY,
KUYBYSHEV PLANTS NO. 1, NO. 18, AND NO. 24*

Summary and Conclusions

The total cost of construction of Kuybyshev Airframe Plants No. 1 and No. 18 and of Aircraft Engine Plant No. 24 is estimated to be US \$124 million, or 70 million rubles.** Based on the estimated relationship between the cost of construction and total fixed capital assets for this industry,*** total capital investment (which includes cost of construction) at these three plants is estimated to be \$278 million, or 156 million rubles.

The estimated cost of construction at Plant No. 1 is \$45 million, or 25 million rubles; at Plant No. 18, \$48 million, or 27 million rubles; and at Plant No. 24, \$31 million, or 18 million rubles. In each plant the major volume of construction activity was carried out before April 1943. After the initial period, however, all three plants were expanded. Plant No. 18 was expanded mainly during the period 1943-59, with relatively little expansion thereafter. Plant No. 1 underwent only minor expansion between 1943 and 1959 but since then has expanded significantly. Finally, Plant No. 24 has expanded continuously since 1943 but at a generally declining rate.

* The estimates and conclusions in this publication represent the best judgment of this Office as of 15 December 1964.

** Throughout this publication, dollar values are given in 1963 US dollars, and ruble values are given in new rubles expressed in 1955 prices. Dollar values in 1963 prices have been deflated to 1955 prices and then converted to new rubles in 1955 prices at the 1955 ruble-dollar ratio of 0.71 ruble to US \$1 for all industrial construction.

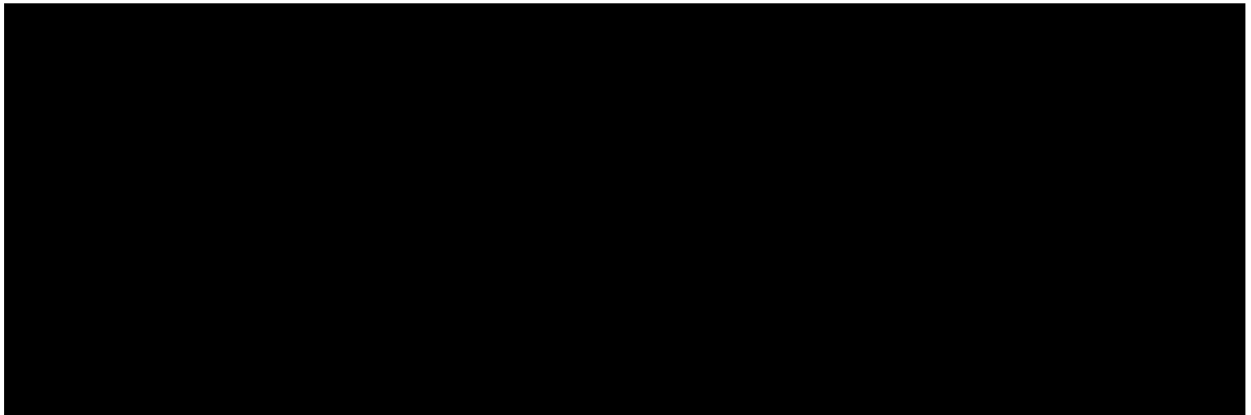
*** For a detailed methodology, see source 1/. (For serially numbered source references, see the Appendix.)

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I. Introduction

The plant layouts used in this publication and the identification of the major buildings, by type, are shown in Figures 1 and 2.* The share of the total building cost allocated to different types of buildings is tabulated below. The larger percentage of total cost in Plant No. 18 for the machine/assembly shop is the result of the addition of two large assembly-type buildings representing approximately 730,000 square feet of roof coverage.

<u>Type of Building</u>	<u>Percentage Share of Total Cost of Buildings</u>		
	<u>Plant No. 1</u>	<u>Plant No. 18</u>	<u>Plant No. 24</u>
Administration/engineering	8	12	6
Forge and foundry	3	1	4
Machine/assembly shop	51	71	70
Warehouse/storage	5	5	7
Power	4	3	
Test			
Airfield	1		5
All others	28	1	
		7	8
Total	<u>100</u>	<u>100</u>	<u>100</u>

* Following p. 7. Unless otherwise indicated, identification and dimensions of the buildings are from published NPIC reports and from reports of this Office.

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25X1D Available information indicates that these plants were built initially for production of aircraft. The majority of construction in all three plants was carried out before 1943, and additions, modifications, and new construction have continued intermittently to the present time. The volume and value of construction as allocated over time and shown in the table are [REDACTED] as interpreted in published reports. 2/

II. Method of Estimating the Cost of Construction and Capital Investment

A. Conditions in the Construction Area

The basis for estimation of dollar costs in this publication was the cost prevailing in 1963 for an area in the US having conditions comparable to those of Kuybyshev. The northern Great Plains region in northwestern North Dakota and northeastern Montana was selected as such a region.

Data on climate and soil for Kuybyshev 3/ indicate that the soils are leached chernozems, consisting of relatively heavy clay and silt. They are underlain by predominantly soft bedrock formed of sand, silt, clay, and gravel, with occasional outcrops of bedded limestone. Information on the depth of soil and bedrock in the specific area under consideration is not readily available.

A construction season in this area of approximately 7 months (from 15 April to 15 November) was considered to be average on the basis of climatic and precipitation tables. This assumption is consistent with published Soviet data which state that supplementary expenditures must be paid to compensate for the special conditions of production in wintertime -- 157 calendar days (or roughly 5 months). 4/ Soils are frozen to a depth of at least 10 inches between late November and early April, with average maximum depths of 32 inches occurring in February and March. Average annual precipitation is 15 inches, with the months of September and October receiving the heaviest amounts (1.7 inches each).

B. Physical Facilities Constructed

Kuybyshev Airframe Plant No. 1 and Kuybyshev Airframe Plant No. 18 probably contain the neatest and most modern facilities for

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USSR: Cost of Capital Investment and Construction in Kuybyshev Aerospace Plants a/
Selected Periods, Pre-April 1943 - July 1964

	Thousand 1963 US \$				Total	
	Before April 1943	April 1943 - November 1959	December 1959 - November 1962	December 1962 - July 1964	Thousand 1963 US \$	Thousand New Rubles b/
Capital investment c/	<u>191,944</u>	<u>56,922</u>	<u>18,374</u>	<u>10,758</u>	<u>277,998</u>	<u>156,235</u>
Plant No. 1	<u>76,179</u>	<u>6,700</u>	<u>12,333</u>	<u>4,396</u>	<u>99,609</u>	<u>55,980</u>
Plant No. 18	<u>69,036</u>	<u>35,204</u>	<u>1,022</u>	<u>3,128</u>	<u>108,389</u>	<u>60,915</u>
Plant No. 24	<u>46,729</u>	<u>15,018</u>	<u>5,018</u>	<u>3,235</u>	<u>70,000</u>	<u>39,340</u>
Of which:						
Construction	<u>85,799</u>	<u>25,444</u>	<u>8,213</u>	<u>4,809</u>	<u>124,265</u>	<u>69,837</u>
Plant No. 1	<u>34,052</u>	<u>2,995</u>	<u>5,513</u>	<u>1,965</u>	<u>44,525</u>	<u>25,023</u>
Building	<u>29,962</u>	<u>2,878</u>	<u>5,440</u>	<u>1,889</u>	<u>40,169</u>	<u>22,575</u>
Heavy	<u>4,090</u>	<u>117</u>	<u>73</u>	<u>76</u>	<u>4,356</u>	<u>2,448</u>
Plant No. 18	<u>30,859</u>	<u>15,736</u>	<u>457</u>	<u>1,398</u>	<u>48,450</u>	<u>27,229</u>
Building	<u>26,897</u>	<u>15,664</u>	<u>402</u>	<u>1,336</u>	<u>44,299</u>	<u>24,896</u>
Heavy	<u>3,962</u>	<u>72</u>	<u>55</u>	<u>62</u>	<u>4,151</u>	<u>2,333</u>
Plant No. 24	<u>20,888</u>	<u>6,713</u>	<u>2,243</u>	<u>1,446</u>	<u>31,290</u>	<u>17,585</u>
Building	<u>17,161</u>	<u>6,660</u>	<u>2,194</u>	<u>1,397</u>	<u>27,412</u>	<u>15,406</u>
Heavy	<u>3,727</u>	<u>53</u>	<u>49</u>	<u>49</u>	<u>3,878</u>	<u>2,179</u>

- a. For purposes of estimation and comparison, the data shown here have not been rounded. The data, however, are believed to be accurate as to the general magnitude.
b. Expressed in 1955 prices.
c. Derived from costs of construction.

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production of aircraft in the USSR. The large manufacturing and shop buildings are constructed of steel girders with exterior walls of red brick. Although not built in accordance with US design, the buildings have many features associated with modern industry. 5/ For the purposes of this publication, Kuybyshev Aircraft Engine Plant No. 24 is assumed to be of the same type of construction as Plants No. 1 and No. 18 because it was constructed at approximately the same time.

C. Costing and Capital Investment

The methodology used in estimating the cost of construction is detailed in a previous publication on the Dnepropetrovsk Missile Development and Production Center. 6/ Buildings and structures were costed on a building-by-building basis. The cost of heavy construction, consisting of sanitary and storm sewers, water supply, roads, railroads, fencing, electrical distribution, and fine grading is estimated on the basis of plant size, visual inspection of photography, scaling from photographs, and published reports. 7/ The costs of construction, distributed over time, are shown in the table.*

Capital investment was determined from the total cost of construction of each plant for each time period. The amount of construction work as a share of fixed capital assets is known for a number of Soviet industries as of 1 January 1956. The share of construction in fixed capital assets used in this publication is the same as that of the Soviet automobile industry** -- 44.7 percent. 8/

III. Limitations of the Data

The limitations of the available data are such that a further expenditure of time and effort could not improve significantly the estimates made in this publication. Assumptions have been made, the validity of which cannot be checked, regarding the labor force, vertical dimensions, details of design, materials and equipment used, and the rate

* P. 5, above.

** Data are not available on the ratio of the cost of construction to fixed capital assets for the Soviet aviation industry. Of the data available, those relating to the automotive industry are estimated to be most applicable. Although the reported figure of 44.7 percent has been used, it should not be construed to mean that the figure is accurate to a tenth of a percent.

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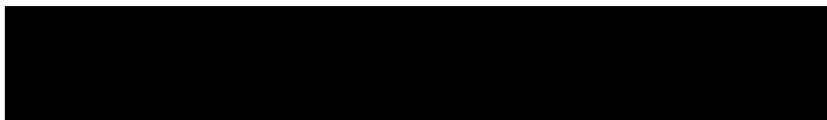
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of construction. On the basis of a belief that errors in the assumptions will tend to balance out, a probable range of error of plus or minus 20 percent has been estimated.

Particularly troublesome problems, which made most of the assumptions necessary, were as follows:

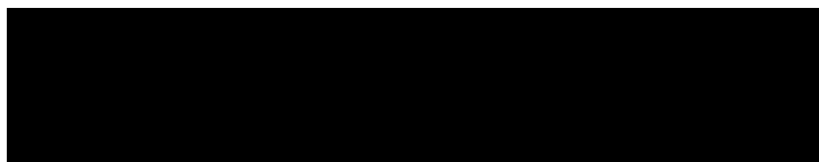
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2. The lack of valid information relative to the size of the construction and production labor force;

3.



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4. The lack of firm data on location of sources of supply and the time allowed by Soviet authorities for completion of each phase of construction.

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